

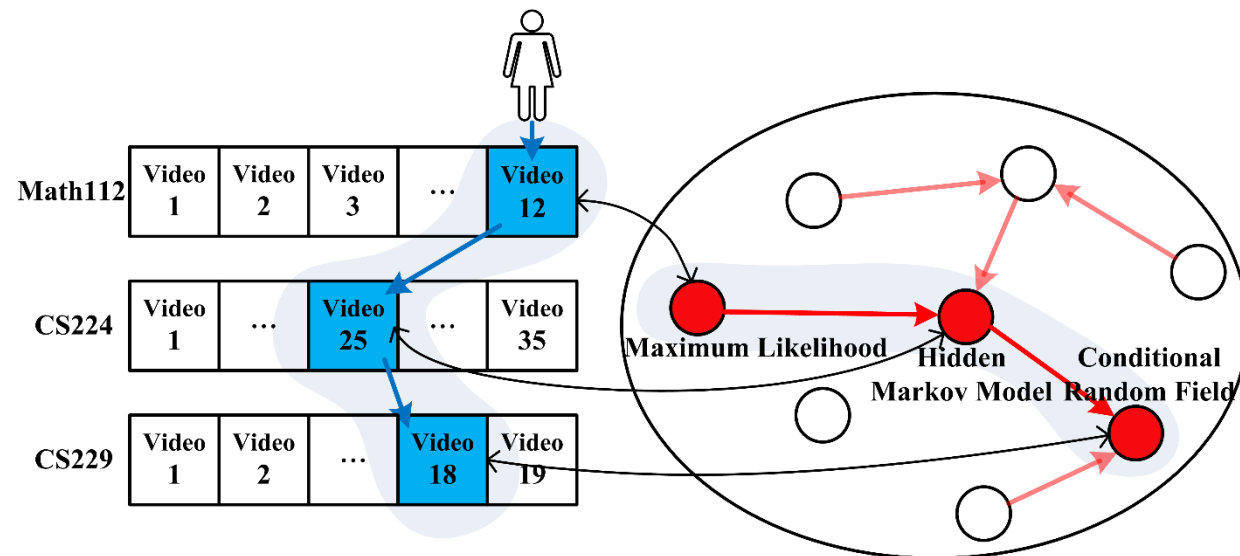


Prerequisite Relation Learning for Concepts in MOOCs

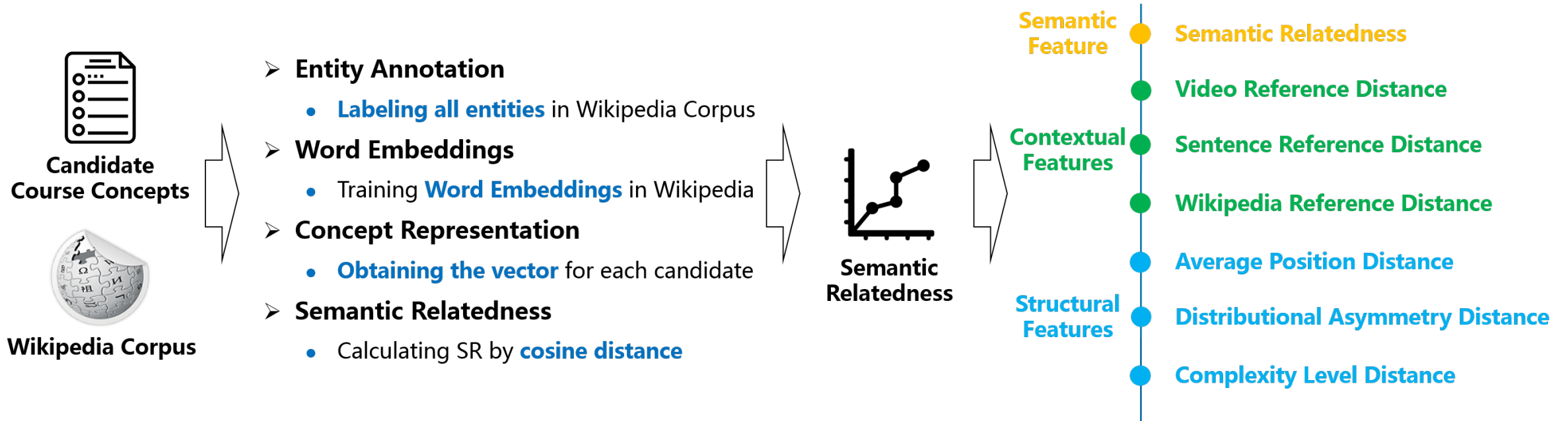
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- The **prerequisite relation** represents the learning dependency between knowledge concepts and is the cornerstone for designing curriculum in schools and universities.
- Our main contributions include:
 - ◆ The **first attempt** to detect prerequisite relations among concepts in MOOCs
 - ◆ Proposal of a set of **novel features** that utilize contextual, structural and semantic information in MOOCs to identify prerequisite relations
 - ◆ Design of three **useful datasets** based on real courses of Coursera to evaluate our method



In MOOCs, automatically discovering the prerequisite relationships among knowledge concepts **can help students easily explore the knowledge space and better design their personalized learning schedule.**



- Step 1: Use Word Embedding-based method to **learn representations** of knowledge concepts
- Step 2: Design of several **distance functions** to capture different features
- Step 3: Train **binary classifiers** to decide whether two concepts have prerequisite relation

■ Datasets

Dataset	#courses	#videos	#concepts	#pairs		κ
				-	+	
ML	5	548	244	5,676	1,735	0.63
DSA	8	449	201	3,877	1,148	0.65
CAL	7	359	128	1,411	621	0.59

- ◆ Collect course video captions from Coursera with three different domains.
- ◆ Extract candidate concepts from and label the candidates as “course concept” or “not course concept”
- ◆ Manually annotate the prerequisite relations among the labeled course concepts.

■ Performances with different classifiers

Classifier	M	ML		DSA		CAL	
		1	10	1	10	1	10
SVM	P	63.2	60.1	60.7	62.3	61.1	61.9
	R	68.5	72.4	69.3	67.5	67.9	68.3
	F_1	65.8	65.7	64.7	64.8	64.3	64.9
NB	P	58.0	58.2	62.9	62.6	60.1	60.6
	R	58.1	60.5	62.3	61.8	61.2	62.1
	F_1	58.1	59.4	62.6	62.2	60.6	61.3
LR	P	66.8	67.6	63.1	62.0	62.7	63.3
	R	60.8	61.0	64.8	66.8	63.6	64.1
	F_1	63.7	64.2	63.9	64.3	61.6	62.9
RF	P	68.1	71.4	69.1	72.7	67.3	70.3
	R	70.0	73.8	68.4	72.3	67.8	71.9
	F_1	69.1	72.6	68.7	72.5	67.5	71.1

THANK YOU

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